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Original Article

ASSESSMENT OF THE CAPACITY BUILDING PROGRAM FOR GRADE 10 SCIENCE TEACHERS: THE K TO 12 PERSPECTIVES

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ABSTRACT

The study examined the effectiveness and curricular implications of the Capacity Building Program (CBP), a professional development program for K to 12 Grade 10 science teachers under Enhanced Basic Education Curriculum. The conduct of this study was anchored on the Context, Input, Process and Product (CIPP) evaluation model.

Product evaluation of the CIPP model ascertained the extent to which a program achieved its goals. Thematic analysis approach was employed in the treatment of qualitative data. Paired t-test for dependent samples was used in determining changes in the participants' science content knowledge and science teaching efficacy belief. Descriptive statistics was used to analyze quantitative data obtained from the participants' teaching performance and end of the program assessment. The school heads' responses during interviews generated central themes involving participants' learning from joining the CBP.

The participants-respondents of the study were the 34 trained Grade 10 science teachers, their immediate supervisors and their students as well as the service provider who facilitated the CBP. Mixed methods design was employed in the conduct of the study. Quantitative data were analyzed using descriptive and inferential statistics while the qualitative data employed the use of the thematic analysis approach.

The research investigated the content knowledge and pedagogical competencies and capabilities of Grade 10 science teachers as implementers of the K to 12 Basic Education Program. The study explored the capabilities of teacher-participants in terms of efficacy belief, increased content knowledge and enhanced competence in teaching and continued professional development.

Findings of the study revealed that the CBP caused a significant increase in the participants' Science Content Knowledge and Science Teaching Efficacy Belief. The participants' teaching performance particularly in classroom planning and preparation, classroom management, teaching skills and assessment of learning outcomes had shown a remarkable improvement.

It is therefore reasonable to conclude that the CBP had a positive impact on the teachers' personal and professional growth. The CBP had served its intended purpose and it was successful as measured by its effects on the participants

KEYWORDS: K to 12 Science Curriculum, Professional Development & Teacher Training Program

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INTRODUCTION

The quality of the educational system of a nation is to a large extent dependent on the relevance of the objectives and the adequacy of the contents of the nation's schools' curricula, as well as the effective implementation of the schools' curricula at various levels. The quality of life of every individual in a society or

nation is greatly influenced by its level of educational development.

In 2012, the Philippine government implemented a herculean task of initiating the start of the K to 12 Basic Education Program, a comprehensive curricular reform in its educational system particularly. This is in accordance with Article XIV, section 2(1) of the 1987 Constitution states that it is the duty of the State to "establish, maintain, and support a complete, adequate, and integrated system of education relevant to the needs of the people and society".

As embodied in the Republic Act No. 10533 otherwise known as the "Enhanced Basic Education Act of 2013, the enhanced basic education program encompasses at least one (1) year of kindergarten education, six (6) years of elementary education, and six (6) years of secondary education, in that sequence. Secondary education includes four (4) years of junior high school and two (2) years of senior high school education. With the advent of globalization and the rapidly evolving modalities in information-gathering and dissemination, the Philippines is catching up with global standards in basic education through this reform. This policy appears admirable and timely, but it faces some pedagogical and socioeconomic problems. One of these is the competence of the teachers to handle the content standards under the new program.

The Capacity Building Program is a 6-day training program, equivalent to 48 hours of actual training and 6 hours for assignment and projects. The contents of the training were divided into two parts, namely: K to 12 special topics and content standards or domains. K to 12 special topics covered the following (a) Updates and Understanding the K to 12 Program; (b) 21st Century Teacher and Learner; (c) Differentiated Instruction; (d) Localization and Contextualization and (e) Assessment of Learning Outcomes. For the content standards, it included the four content areas of science: (a) Earth and Space (b) Force, Motion and Energy (c) Living Things and Their Environment and (d) Matter. The course content was drafted based on the curriculum guide for Grade 10 Science. The delivery of the course was an integration of content, strategies and assessment.

The study was anchored on Stufflebeam's (2003) and Stufflebeam & Shinkfield's, (2007) Context, Input, Process, Product (CIPP) model. It is based upon the view that the most important purpose of evaluation is to improve the functioning of a program. Figure 1 shows the interplay of the four components of the model.

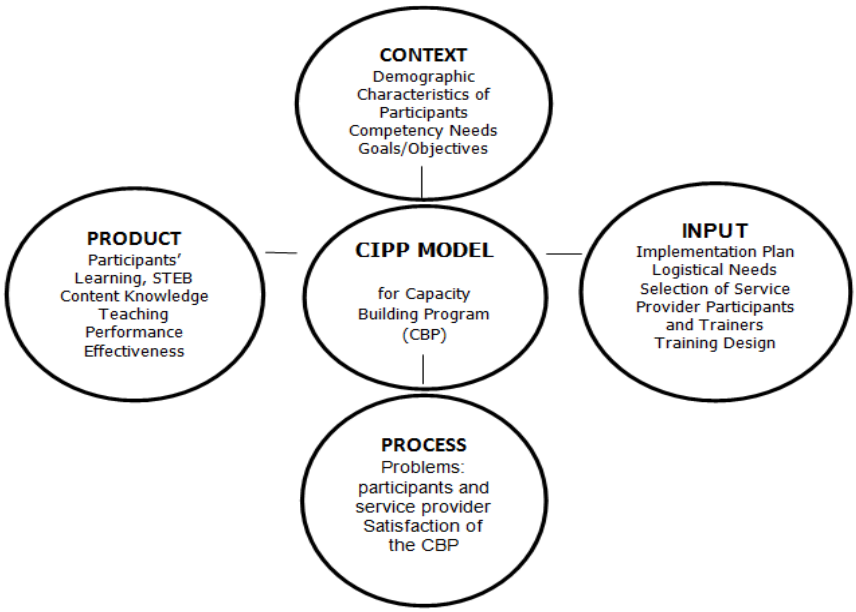

Figure 1: Framework of the Study

All four components of Stufflebeam's CIPP evaluation model play important and necessary roles in the planning, implementation, and assessment of a project. According to Stufflebeam (2003), the objective of context evaluation is to assess the overall environmental readiness of the project, examine whether existing goals and priorities are attuned to needs, and assess whether proposed objectives are sufficiently responsive to assessed needs.

The purpose of the study was to determine the effectiveness of the Capacity Building Program for science teachers, a professional development program which aimed at improving the capability of teachers in the implementation of the K to 12 Basic Education Program.

The author presents a discussion of the product evaluation component of the Assessment of the Capacity Building Program which focuses on the effectiveness of the program. Specifically the study sought answers to the following problems on product evaluation:

- What are the participants' learning gained from the Capacity Building Program that will be useful in the implementation of Grade 10 Science Curriculum from the perspectives of the school heads and the participants themselves?
- What is the level of participants' Science Teaching Efficacy Belief before and after the Capacity Building Program?
- Is there any change in the content knowledge of the science teachers after their participation in the Capacity Building Program?
- What is the extent of performance of the participants as perceived by the school heads, service provider and students in terms of
    - Classroom planning and preparation?
    - Classroom management?
    - Teaching skills?
    - Assessment of learning outcomes?
- What is the extent of effectiveness of the Capacity Building Program based on the following components?
    - Program planning, management and preparation?
    - Attainment of objectives?
    - Delivery of the content program?
    - Trainees learning?
    - Trainers' conduct of session?
    - Provision of support materials?
    - Program management team?
    - Venue and accommodation?

- Readiness of implement Grade 10 science curriculum?

METHODOLOGY

The proponent of this study believe that understanding teachers' efficacy in relation to professional development is a complex phenomenon requiring a pragmatic approach, hence, a mixed methods design with focus on integrating different sources of data was utilized in this study. By using a mixed-methods design the proponent was able to reveal a new and more complete picture of teachers' professional development and efficacy than in previous studies that relied on limited data source.

The purpose of the study was to assess the Capacity Building Program as professional development for teachers in the Department of Education (DepEd) from the perspectives of Grade 10 science teachers of the K to 12 Basic Education Program. The Stufflebeam and Shrinkfield (2007) evaluation of CIPP model was used in this study. The collective data were gathered from the Capacity Building Program participants and DepEd Service Provider through questionnaires, focus group discussions, interviews and classroom observations. The research followed a mixed methods design of quantitative and qualitative data analyses. Descriptive and inferential statistics were used to analyze the quantitative data collected through the questionnaires while the qualitative part of the study employed a thematic analysis approach by Braun, V and Clarke, V. (2006).

Participants-Respondents of the Study

Division of Iloilo City is composed of 7 districts with a total of 13 public secondary schools. Random sampling was utilized in determining participants-respondents per district. To have a comprehensive evaluation and deeper understanding of the effectiveness of the Capacity Building Program to science teachers' implementation of the K to 12 Basic Education Program, 10participants were chosen using purposive sampling to generate qualitative data. A total of 34 science teachers were considered as respondents and participants of the study. They were also observed in their respective classes by the service provider and their school heads. The school heads as well as five (5) students of the 34 science teachers were also considered as participants of the study. The students were chosen randomly. Out of the 34 teacher-participants, 10 of them were invited to take part in the focus group discussion. Responses of the teacher-participants during interview were generated for qualitative data analyses using thematic approach. The service provider of the training program was likewise given a questionnaire to accomplish and requested to participate in the interview. In order to address ethical issues in the conduct of the proposed study, a consent form was distributed to the teachers who participated voluntarily in the research.

Data Gathering Instruments

Since the study is a comprehensive research evaluation of the Capacity Building Program for Grade 10 science teachers, several instruments were developed, validated and adapted for the purpose of collecting the data needed for the present study. The research instruments that will be utilized include the following: science content knowledge pre and post-tests, science teaching efficacy belief instrument, end of the program assessment instrument, interview guide for participants, school heads and service provider and instructional monitoring tool

Procedures on Data Gatheringand Analysis

The research employed both qualitative and quantitative designs or mixed methods design. Specifically, the

quantitative approach focused on numerically or statistically significant differences while the qualitative process involved seeking thick and rich detail in relation to particular questions, phenomena or groups of people. As mentioned earlier qualitative data were generated using the thematic analysis approach. The researcher choose both qualitative research (focus group discussions and interviews) and quantitative research (questionnaires) to broaden the base of data collection and better increase the insights that might be gained from the participants. The study was conducted in two phases. Phase 1 covered evaluation of the three components namely: Context, Input and Process while phase 2 involved the fourth component which is the Product evaluation

RESULTS AND DISCUSSIONS

Mixed method design which utilized both quantitative and qualitative methods was used to analyze the data gathered during and after the training program in order to answer the product evaluation component of the CIPP model. Product evaluation component answers the question: Is the Capacity Building Program successful as measured by its effects on the participants?

- What are the participants' learning from the Capacity Building Program that will be useful in the implementation of Grade 10 Science Curriculum from the perspectives of the school heads and the participants themselves?

Figure 2 elucidates the thematic analysis map for participants' learning in the training program from the perspectives of the school heads and the participants themselves.

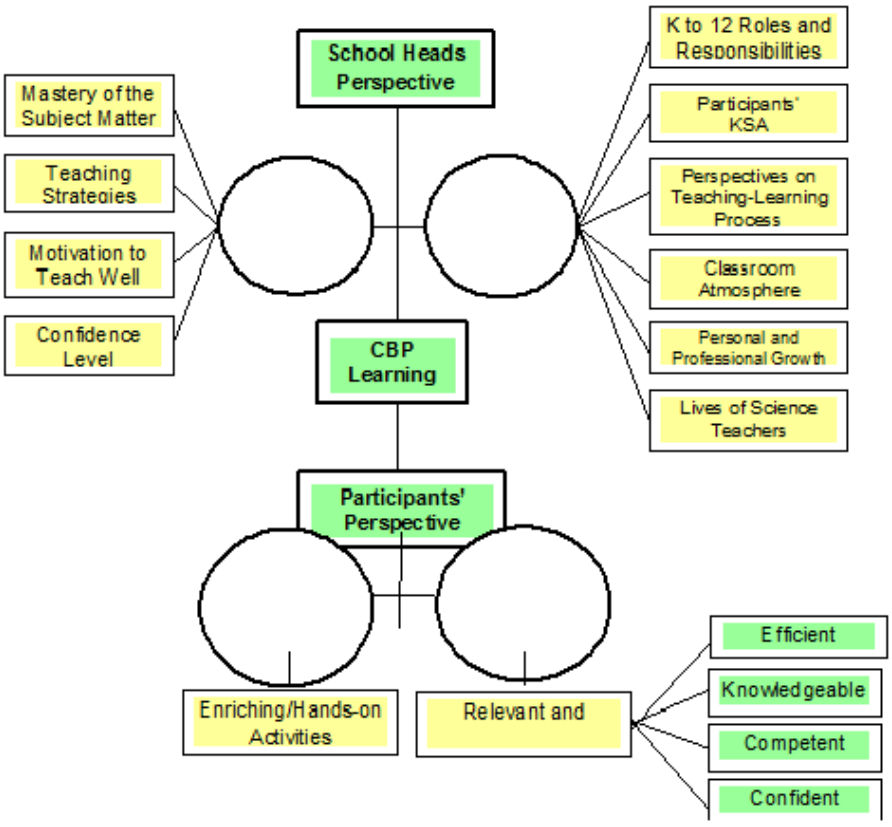

Figure 2: Thematic Analysis Map on the CBP Learning

Capacity Building Program Effects on the PERFORMANCE of the Science Teachers: the School Heads Perspectives

Improvement of science teachers' mastery of the subject matter.This is exemplified by LU, *"Yes, the CBP improved the teachers' mastery of the various subject matters since teachers have to teach science subjects that were not their specialization"*. AD added that *"Yes, because topics were simplified according to the capability or level of the learners"*. LA also mentioned that *"Yes, the teachers showed mastery of their subject matter as they deliver their lessons accurately using appropriate methodology"*. Moreover, JD said that *"Yes, it was evident from the teachers' delivery that they've shown mastery of the subject matter especially in their own field of specialization. However, trainings on content areas specifically the 4 domains in the K to 12 should also be implemented to further enhance the capability of science teachers in teaching the subject"*. Furthermore, MO said that *"Yes, and in addition, it inspired teachers to study more on the subject matter specifically not in their field of specialization"*. However, at least two of the school heads were not satisfied with the training of their teachers. This is exemplified in the following excerpt of transcripts: MA said that "*Somehow, it did but not enough"* and CP said that *"Not so, because only limited topics on science content were given during the training"*.

Improvement of science teachers' teaching strategies. According to JD, he said that *"Yes, I have noticed that most of their teaching strategies greatly improved as manifested in their delivery. Most of the activities were hands-on and using an inquiry-based approach to teaching science"*. In addition, LU said that "*Yes, the CBP improved the science teachers' teaching strategies since the trainers shared new teaching strategies"*. MO also said that *"Yes, teachers have learned new teaching strategies, new laboratory activities and they were motivated to be more creative and innovative"*. Moreover, CP said that *"Yes, teachers gained/learned on how they will deliver/facilitate the lesson with the students. The teachers utilized differentiated teaching strategies appropriate to the grade level of the students"*. AD also added that "*Yes, because it involved varied strategies and approaches that was suited to the needs of the learners"*. Furthermore, MA said that *"Yes, in so far as it did in teachers' mastery of the subject"*. *Lastly, LA said that "The teachers became more comfortable and proficient with the 4A's. or the inquiry-based model"*.

Improvement in the motivations of science teachers to teach well.This was manifested by JD, He said that "*Yes, science teachers showed a high degree of motivation to teach well since the materials needed in their activities were easily found in the locality. Indigenous materials were used to suit the local setting"*. CP also said that *"Yes, the teacher was motivated to teach well because of the knowledge and skills learned in CBP"*. In addition, LU expressed that *"Yes, the science teachers were inspired to teach well for they were taught how to simplify the lessons, and were given websites to open for further learning"*. AD affirmed the same notions: *"Yes, because I have observed that most of the learners needs were addressed and given appropriate intervention by the so called indigenization/localization and contextualization"*. MO observed that teachers were also inspired to teach after the training. He said, "*Yes, they were inspired to teach well especially if the materials needed were readily available"*. MA added that *"It did inspire and motivate the teachers that enabled them to create more support, instructional materials and; localized materials to fit the demand"*. Moreover, LA said that "*With the availability of learners' manual and teachers' guide (LM/TG), the teachers were inspired to deliver the lesson with confidence"*.

Improvement of science teachers' confidence level.The teacher-participants exuded a certain level of confidence after attending the training program. This notion was exemplified by JD, he said that *"Yes, to a very high extent. Teachers*

have shown confidence in teaching since they were provided with learning materials and teaching guides after the CBP training. I believe the availability of these learning materials boosted the confidence level of the teachers". However, there were those who expressed that they should further undergo training in other domains of science which were not their area of specialization". LU added that *"Because of the CBP, the science teachers, most especially those assigned to handle Grade 10 students improved their confidence level. Physics, majors can now teach Biology and Chemistry as well as Earth Science given a scale of 1-10 (10 being the highest), of 7"*. CP also added that *"Yes, the CBP boosted her confidence level in teaching science"*. In addition, MO added that *"Yes, almost all teachers have improved their self-confidence in teaching the subject especially after 2 years in which they have already mastered their subject matter"*. Moreover, AD said that *"Yes, because materials were easily available and it can provide challenges and opportunities for the teachers particularly her/his resourcefulness"*. Furthermore, LA said that *"The teachers became more confident in teaching the subject since the TG and the LM already provided them with appropriate strategies and activities to deliver in the class"*.

Capacity Building Program: Impact on Process, Growth of Teachers, their Roles and Responsibilities under the K To 12 Basic Education Program

*I*mpact on science teachers' roles and responsibilities under the K to 12 basic education program. According to AD, he said that *"Teachers as facilitators of learning were given clear understanding of these roles and commitments, the K to 12 Program particularly the skills needed in the 21st Century"*. In addition, CP said that *"Yes, teachers learned well of what were expected of them as teachers of the 21st century learners"*. LU also said that *"Yes, teachers were well aware of their roles as facilitators of learning and agents of change among students"*. Moreover, MO said that *"Yes, teachers were more aware of their roles and responsibilities in the K to 12 BEP. They embraced the program whole heartedly and with open arms"*. MA said that "*I agree. it did. It provide not only a clear understanding of their roles and responsibilities in the K to 12 Education Program but even with the advantages that it provided to the educational system"*. Furthermore, LA said that *"Transition from the last curriculum to the K to 12 of the BEC was not so difficult for the teachers and they have clear perception of their role as facilitators in the development of the 21st century skills among their students"*.

Improvement of science teachers' knowledge, skills and attitudes. According to LA, he said that *"The teachers gained confidence from the training since they were enriched with the various teaching techniques, Strategies or approaches for the varied learners"*. LU added that *"Yes, the CBP helped the teachers provide intervention activities among learners"*. Moreover, AD said that *"Yes, an example was the strategies employed for differentiated learning"*. MO also said that *"Yes, it had greatly helped teachers to devise strategies to suit to different or varied learners"*. Furthermore, JD observed that *"Yes, as observed teachers had exhibited improvement in their knowledge in the delivery of their lesson. Science teachers had also shown varied degree in dealing with different kinds of learners"*.

Science teachers' perspectives on the teaching-learning process. The notion of students having particular learning styles has implications for teaching strategies. Because preferred modes of input and output vary from one individual to another, it is critical that teachers use a range of teaching strategies to effectively meet the needs of individual learners. This is exemplified by LA, he said that *"The teachers developed new outlook on the 21st century skills to be developed among their students especially on creativity and communication skills"*. AD added that *"Yes, it has sufficiently furnished the teachers with appropriate strategies for the 21st Century learners"*. In addition, MO said that *"Yes, it has provided teachers new perspectives, in teaching-learning process specifically on learning outcomes"*. MA agreed that *"I agree also since they felt having a new dimension and such viewing enabled them to see their previous common mistakes that gave*

rooms for improvement". Moreover, CP said that *"Yes, provision of teachers and learners manual and other materials helped teachers a lot"*. LU added that *"Yes, they were inspired to use varied activities and employed activity-based strategies"*. Furthermore, JD said that *"Yes, the science teachers in our school were now adopting the 4A's and 5E model of inquiry-based in teaching science. A commendable improvement compared to the previous years"*.

Creating a classroom atmosphere conducive to teaching and learning. LA observed that *"The teachers gradually developed new insights regarding the 21st century learners as they constantly try to create a friendly environment in the classroom"*. MA added that *"It supposed to lead to such direction but unfortunately, a new building was approved to be constructed and another one renovated that hindered their inclination toward such creativity"*. In addition, MO said that *"Yes, it has improved the creativity and resourcefulness of teachers in room structuring to make it more conducive to teaching and learning"*. Moreover, AD said that *"Yes, because interactive approach is encouraged or enhanced"*. LU mentioned that *"Because of the confidence gained by science teachers brought about by the CBP, their attitude towards teaching subjects which were not their specialization has improved a lot"*. Furthermore, JD said that *"Yes, science teachers were now using activity-based lessons using the inquiry-based approach. They provided activities which involved majority of the students, their approach is more hands-on and engaging. However, due to the nature of the activities, there is a need to restructure the classroom that is by providing working tables where students could work comfortably"*.

Significant changes in the personal growth and professional development of science teachers. According to CP, he said that "the learning gained by the teachers was evidently applied in their teaching and the certificates they earned/received had helped a lot for their application for promotion". AD added that *"Yes, it had greatly increased the teachers' level of confidence particularly in emphasizing the 4 domains which I believe can provide the appropriate intervention to students' learning"*. In addition, JD said that *"Yes, they were encouraged to pursue higher studies in order to be able to deliver what was required of them"*. LA also added that *"The teachers were challenged to pursue further studies and they work diligently on the teaching-learning related activities and reports"*. Moreover, MO said that *"Yes, science teachers have grown professionally after the CBP"*. Furthermore, LU said that *"Yes, because they've gained confidence in teaching subjects which were not in their field of specialization. They were also encouraged to ask help from their co-teachers and peers"*.

Making an impact on the lives of science teachers. According to LA, he said *"The training provided teachers with significant insights on the changes they should adopt in order to contribute to the success of the K to 12 of the BEC implementation"*. AD agreed that *"Yes, it provided opportunities for science teachers to be innovative, resourceful, confident, realistic and practical. The teachers gained more understanding on how to deal with current trends and ideas in teaching and learning"*. LU also added that *"Yes, it can provide opportunities for science teachers to be innovative, resourceful, confident, realistic and practical. The teachers gained more understanding on how to deal with current trends and ideas in teaching and learning"*. Moreover, MO said that *"Yes, it had greatly made a positive impact on the total personality of a teacher"*. CP observed that *"Yes, teachers felt proud being part of the implementation of the new curriculum"*. Furthermore, JD said that *"Yes, with the confidence that they had developed after the CBP, they were now more aware of the importance of the K to 12 and its contributions to the students welfare"*.

Capacity Building Program Activities That Were Relevant To the Teachers' Performance and Responsibilities the Participants' Perspectives

Teacher-participants personal capital in their performance and responsibilities. Teachers have a direct impact on

learning and the development of human capital in their students. Researchers have found that teacher quality has positive effects on students' accumulation of human capital and achievement (Asarta, Butters, and Thompson 2014). However, teacher quality is difficult to quantify. Some studies have sought to explain teacher quality by examining teacher characteristics. For example, Rice (2010) found that experienced teachers had students who exhibited greater achievement gains than the students of their less experienced colleagues. Not only does teacher experience matter, but teacher knowledge can impact student knowledge. Shulman (1986) first developed the concept of pedagogical content knowledge. Embodied in pedagogical content knowledge is the understanding that well-trained teachers need to know not only the content they are teaching but also how to teach the content. Today, teacher-training programs focus on building pedagogical content knowledge, rather than concentrating exclusively on pedagogy or content (Shulman 1987). According to AD02, *"Most of the activities done were relevant and were useful or necessary for us teachers to be more efficient, knowledgeable, confident and competent"*. AD02 emphasized that *"activities during the Capacity Building Program helped them a lot by developing their efficiency as a teacher, knowledge of the subject matter, confident to teach in the grade 10, and competent in teaching"*. Activities in the Capacity Building Program played an important role in the performance and responsibilities of teachers in the Grade 10. Aside from that, AD01 said *"That learners must work in a team or in a group"*. *Teachers must also utilize teamwork in their activities to the students"*.

Importance of K to 12 enrichment activities in the performance and responsibilities of teachers. Enrichment activities are adjunct activities and programs that are held either during or after school hours, and complement the classroom instruction and textbook material being presented to students in grades K to 12. These activities both enhance the student's learning experience and broaden the scope of what they are learning through practical experiences that link the academic theory with real world applications and offer personal and social development opportunities to the learners involved. This was exemplified by JD06, He said that *"All the activities during the seminar were so enriching for me because that was my first time attending K to 12 seminar and it helped me a lot in implementing K to 12 fully. Delivering the lessons well to the students and making them relevant to their lives"*. Activities in the Capacity Building Program enriched teachers in the delivery of their lessons, assessment of student learning, and implementation of the K to 12. Teacher-participants also mentioned some specific activities that made an impact to their experience during the seminar. According to LA08, *"For me, science investigation were most relevant to the performance of my duties as a K to 12 teacher"*. He emphasized that the most relevant activity that contributed a lot to his performance as K to 12 teacher was science investigation. Science investigation is very important to science teachers because this is one of the 21st Century skills that students need to learn. LU10 added that "Lesson plan making". Lesson plan making was one of the activities in the seminar that enhanced teachers' strategies to develop an effective lesson plan for a fruitful teaching-learning process. In addition, LU11 said that *"The hands on activities and the differentiated instructions". Hands-on activities were also done during training that made the teachers developed an effective activities that learners enjoyed and learned"*. The differentiated instructions dealt with the different multiple intelligences of the students. In this case, teachers need to know the most dominant multiple intelligence of their students in a class in order for him to plan a strategy for an effective teaching-learning process. Moreover, CP03 said that *"It was the contextualization and localization that was a very relevant topic because teacher can test and teach resourcefulness of the students in using local materials available"*. Furthermore, MO14 said that *"Pledge of commitment. It made me realized how vital my role is as a science teacher in helping my students to appreciate and learn science in a meaningful and practical way"*. MO14 echoed the same sentiment; he said that "*one of the activities that made him realized his responsibilities as a science teacher was the pledge of commitment*".

It helped him realized that students must appreciate and learn science in a meaningful and practical way. Lastly, MO15 said that *"Understanding the 21st Century Learners, Utilizing appropriate strategy in teaching and designing activity, and learning contextualization and localization of subjects"*. MO15 summarized his learning from the seminar, he emphasized that *"teachers need to understand the 21st century learners, utilize appropriate strategy in teaching and designing activities, and integrate the contextualization and localization in science subjects and also in other subjects for students to learn easily"*.

- What is the level of the participants' Science Teaching Efficacy Belief before and after the Capacity Building Program?

Personal Science Teaching Efficacy (PSTE) belief refers to the extent that teachers believe they have the capacity to positively affect students' achievement. Science teaching outcome expectancy (STOE) refers to the extent to which teachers believe that they can affect student learning, in spite of any other factors (Schriver & Czerniak, 1999).

In this study, paired t-test was performed to ascertain the participants' Science Teaching Efficacy Belief during the conduct of the Capacity Building Program. Table 1 reflects the results of the participants' efficacy belief.

Table 1: Pre-Post Comparison of Participants Science Teaching Efficacy Belief (STEB)

Paired Differences						
STEBI Scale	**N**	**Mean**	**SD T**	**DF**	**P**	**Eta^2**
Pre-Post STOE	34	11.441	4.039	17.039	33	0.0000.90
Pre-Post PSTE	34	14.500	4.962	16.517	33	0.0000.89
Pre-Post STEB	34	25.941	7.532	20.084	33	0.0000.92

In general, Science Teaching Efficacy Belief Inventory (STEBI) results indicated that science teaching self-efficacy of participants as reflected in their post-test score (M = 101.412, SD = 7.249) had significantly improved (p = 0.000, t= 20.084, df = 33,) after completing the Capacity Building Program compared to their pre-test score (M = 75.471, SD = 4.974). The mean paired difference in the participants' STEBI was recorded at 25.941. The 95% confidence interval (*CI*) for mean difference is from 23.313 to 28.569. This means that if this study is replicated 100 times, 95 times the true value for the difference would lie in the 95% confidence interval. The *eta squared* statistic for STEB of 0.90 indicated a large effect size. The findings of this study was consistent with the results of Cannon and Scharmann (1996) and Riggs and Jesunathadas (1993) Researchers using the STEBI have found that teacher efficacy was positively related to science teaching skills (Bandura 1997, Palmer 2011, Henson 2001).

Cannon and Scharmann (1996) reported that cooperative field experiences had a positive influence on the subjects' science teaching self-efficacy. Their study used the STEBI to evaluate changes in self-efficacy of science teachers as a result of collaborative professional development experiences. The results of their study indicated that teachers who evidenced greater success in and enjoyment of student-centered teaching, scored higher on the STEBI self-efficacy scale. They contended that professional development programs that raise teachers' self-efficacy were important and should be encouraged. Riggs and Jesunathadas (1993) found that teachers who exhibited high teaching efficacy were more likely to spend the time needed to thoroughly develop science concepts in their classrooms.

The Science Teaching Efficacy Belief Inventory Scale consisted of two components, namely: Personal Science Teaching Efficacy (PSTE) and Science Teaching Outcome Expectancy (STOE) Significance were also found in both components of the STEBI. The study revealed that there was a strong evidence that participants experienced significantly

higher post-test score in PSTE (p = 0.000, t = -17.039, df = 33)) after their participation in the training program (M = 57.471, SD = 4.672) than their pre-test score (M = 42.971, SD = 3.099) before attending the training program. The *eta squared* statistic for PSTE of 0.92 indicated a large effect size. These results indicated that CBP participants increased their confidence in their ability to perform a certain task, in this case teaching Grade 10 Science effectively. The findings of this study affirmed the earlier notion of some researchers regarding PSTE. As mentioned by Riggs *et al* (1994)scores on the PSTE scale have been shown to positively relate to teaching performance. Riggs (1995) further demonstrated that teachers who scored low on the PSTE scale spent less time teaching science and were rated weak by observers. At the end of a professional development course, Lee *et al.* (2004) found that the teachers involved reported improvements in their beliefs about their own knowledge about science inquiry, as well as in their beliefs about how important it was to communicate this knowledge to their students. When compared with the goals for their students that they had outlined at the beginning of the course, their goals at the end were much more detailed, as well as making some specific mention of the inquiry process.

The second component is the Science Teaching Outcome Expectancy. Outcome expectancy refers to how the individual perceives his or her influence will impact the desired outcome. Therefore teachers with high outcome expectancy will tend to believe that their teaching can change student outcomes. Conversely, teachers with low outcome expectancy believe that they cannot change student outcomes, regardless of their teaching ability. Teachers with positive outcome expectancy tend to increase desired behaviors, such as using new methods of teaching, because they believe they will achieve the desired outcome (Lakshmanan *et al.*, 2011). The findings of this study showed that the sig (2-tailed) value of STOE (p = 0.000, t = -16.517, df = 33) was less than 0.05, thus it can be gleaned that there is a statistically significant difference between the pre-test and post-test mean scores of the CBP participants. The mean paired difference in the participants' STOE was registered at 11.441. The 95% confidence interval is from 10.032 to 12.851. This means that 95 times the true value for the difference would lie in the 95% confidence interval. The *eta squared* statistic of 0.89 indicated a large effect size. These findings further validated the study conducted by Lakshmanan *et. al.*2011) on professional development program, designed for science teachers, that focused on content courses for teachers and professional learning communities (PLCs). The research team found out that teachers with positive outcome expectancy tend to increase the desired behavior, such as using new methods of teaching, because they believe they will achieve the desired outcome. Lumpe *et. al.* (2012)mentioned that teachers with high self-efficacy were more effective, their students performed at higher levels on standardized achievement tests, and their students had more positive attitudes toward the content areas taught by these teachers. Thus, it can be inferred that participants of CBP were more positively disposed towards science and could result in an increased use of inquiry pedagogy in the participants' classrooms.

- Is there any change in the content knowledge of the science teachers after their participation in the Capacity Building Program?

To determine the effect of the training program on teachers' science content knowledge, a paired t-test was conducted for each component of the science content or domain as identified in the K to 12 Science Curriculum. The following components of science content were tested, namely: K to 12 Special Topics, Force, Motion and Energy, Matter, Living Things and Their Environment and Earth and Space. Table 2 reflects the data generated from the pre and post-tests as well as the result of the paired t-test.

Table 2: Pre-Post Comparison of Participants' Science Content Knowledge Test Score

Paired Differences							
Science Content	**N**	**Mean**	**SD**	**T**	**DF**	**P**	**Eta^2**
Pre-Post Science Content	34	8.265	2.916	16.526	33	0.000	0.89
Pre-Post K to 12 Special Topics	34	1.118	1.094	5.954	33	0.000	0.51
Pre-Post Force, Motion & Energy	34	1.706	1.360	7.313	33	0.000	0.61
Pre-Post Matter	34	1.588	1.158	7.999	33	0.000	0.66
Pre-Post Living Things	34	2.000	1.435	8.124	33	0.000	0.67
Pre-Post Earth & Space	34	1.853	1.579	6.843	33	0.000	0.59

The overall result of the paired sample t-tests on science content or domain reflected a significant difference in the pre and post-tests mean scores. The participants' pretest mean score (M = 25.824, SD = 4.041) had significantly increased compared to their posttest mean score (M = 34.088, SD = 3.379). The result yielded a mean difference (M = 8.265, SD = 2.916) which was statistically significant (p = 0.000, t = 16.526, df = 33). The *eta squared* statistic for science content or domain of 0.89 indicated a large effect size. This implies that the participants have improved their science content knowledge which could help them become effective implementers of the K to 12 Science Curriculum. It was noteworthy that the same significant increase was observed in all the components of science contents or domains. Among the science domains, the participants obtained the highest mean difference (M = 2.000, SD = 1.435) in Living Things and Their Environment. This result also reflected a significant difference (p = 0.000, t = 8.124, df = 33) in the participants' performance in this particular science domain. The participants' pre-test mean score (M = 5.412, SD = 1.438) had significantly improved after the training program where they registered a posttest mean score (M = 7.412, SD = 1.258). The *eta squared* statistic for this particular domain of 0.67 indicated a large effect size.

The second highest mean difference (M = 1.853, SD = 1.579) was obtained by the participants in Earth and Space science domain where they recorded a pre-test mean score (M = 4.735, SD = 1.333) and a post-test score (M = 6.588, SD = 1.048), the mean difference was likewise significant (p = 0.000, t = 6.843, df = 33). The *eta squared* statistic for Earth and Space of 0.59 also indicated a large effect size.

The performance of participants in Force, Motion and Energy has shown an increase in test scores, pretest score (M = 3.706, SD = 1.382) and post-test (M = 5.412, SD = 1.395). The mean difference (M = 1.706, SD = 1.360) likewise gave a significant result (p = 0.000, t = 7.313, df = 330). The *eta squared* statistic of 0.61 indicated a large effect size.

In the case of K to 12 Special Topics, the participants' pretest (M = 6.971, SD = 1.425) and post test score (M = 8.088, SD = 0.933) produced a mean gain score (M = 1.118, SD = 1.094). Although the mean difference was the lowest among the other components, the result was still regarded as significant (p = 0.000, t = 5.954, df = 33). The *eta squared* statistic for K to 12 Special Topics of 0.51 indicated a large effect size.

In the science domain, Matter the participants likewise improved their content knowledge as reflected in their pre-test (M = 5.000, SD = 1.477) to their post-test mean score (M = 6.588, SD = 1.416). This gave a mean difference of (M = 1.588, SD = 1.158) which is also significant (p = 0.000, t = 7.999, df =33). The *eta squared* statistic for this particular science content or domain of 0.66 likewise indicated a large effect size.

The result of this study validates the previous studies cited on the effect of professional development on science teachers' content knowledge and skills. Borko (2004) cited numerous studies (Fennema et al., 1996; Franke et al., 2001; Knapp & Peterson, 1995) which indicate that the learning process for teachers can be lengthy and inexact and that some

teachers change more than others during participation in the same professional development. Borko also stated that some elements of teachers' knowledge and practice are more readily altered than others. A study by Quint (2011) was designed to test the effects of professional development in the causal model. Her findings suggest that professional development can increase teacher knowledge which can improve instruction and ultimately lead to greater student achievement.

- What is the extent of performance of the participants as perceived by the school heads, service provider and students in terms of
  - Classroom planning and preparation?
  - Classroom management?
  - Teaching skills?
  - Assessment of learning outcomes?

To gauge the extent of classroom teaching performance of the CBP participants, the Instructional Monitoring Tool was used for this purpose. A total of 10 school heads from different school districts, 170 students (5 students for each 34 participants) and 1 service provider acted as evaluators of teachers' classroom performance. Table 3 shows the results of participants' classroom performance evaluation.

Table 3: Mean and Standard Deviations of Participants Teaching Performance

Performance Indicators	School Head				Service Provider Students	
	N = 10		N = 1		N = 170	
	Mean	SD	Mean	SD	Mean	SD
A. Classroom Planning	4.212	0.490	4.018	0.410	4.158	0.750
B. Classroom Management	4.165	0.498	4.188	0.412	4.167	0.699
C. Teaching Skills	4.076	0.573	3.630	0.334	4.165	0.731
D. Assessment of Learning Outcomes	4.140	0.519	3.154	0.399	4.287	0.749
Overall	4.141	0.475	3.765	0.321	4.187	0.669

Note: *1.00-1.80 (Very Limited Extent) 1.81-2.61 (Limited Extent) 2.62-3.41 (Average Extent) 3.42-4.21 (High Extent) 4.22-5.00 (Very High Extent)*

The general and unanimous consensus among the group of evaluators showed that the overall teachers' classroom performance was rated at a high extent by the students (M = 4.187, SD = 0.669), school heads (M = 4.141, SD = 0.475), and service provider (M = 3.765, SD = 0.321). All components of the teachers' classroom performance were also consistently rated at high extent except in the case of assessment of learning outcomes. This is a manifestation that there was also a high degree of agreement among the ratings of these groups of evaluators. Assessment of learning outcomes was rated to a very high extent by the students (M = 4.287, SD = 0.749). This is in contrast with the average extent rating (M = 3.154, SD = 0.399) of the service provider for the same performance indicator. Although the rating for each component was generally to a high extent, there were similarities and differences noted for each performance indicator. For instance, in the case of classroom planning and preparation particularly item no. 4, "*the teacher prepares a variety of teaching aids for specific purposes" both* the school heads (M = 4.118, SD = 0.686) and the service provider (M = 3.647, SD = 0.734) rated this as the least among the constructs although it was considered as high extent. In the case of classroom management particularly item No. 8, "*the teacher maintains order and discipline in the classroom"* was rated very high extent. The agreement was noted between the school heads' rating (M = 4.235, SD = 0.781) and that of the

students' (*M* = 4.235, *SD* = 0.912). Teaching skills component item number 13: "*the teacher relates the subject matter to actual experiences and integrates with other fields*", showed an average extent rating from the service provider at (*M* = 2.677, *SD* = 0.589) and a high extent rating from the students (*M* = 3.941, *SD* = 1.123). These ratings were both considered the least among the constructs for teaching skills component. As far as the assessment of learning outcomes was concerned, all the three groups of evaluators rated item number 21: "*the teacher rates the students fairly and objectively"* as the highest among the constructs under this component. School heads' rated it to a very high extent (*M* = 4.588, *SD*=0.657), while the service provider considered it to a high extent rating (*M* = 3.677, *SD* = 0.535) and the students' very high extent rating (*M* = 4.359, *SD* = 0.994). An agreement of the lowest rating among the constructs of assessment of learning outcomes was also observed between the school heads' (*M* = 3.853, *SD* = 0.657) and the service provider's limited extent rating (*M* = 2.559, *SD = 0.561*) on item number 18: the "*teacher evaluates students' learning outcomes in terms of knowledge, understanding, process and product'*. These findings implied that the teachers were not yet fully accustomed to making evaluation techniques covering the new domains of knowledge, understanding, process and product which was newly introduced under the K to 12 Science Curriculum.

- What is the extent of effectiveness of the Capacity Building Program based on the following components
    - Program planning, management and preparation?
    - Attainment of objectives?
    - Delivery of the content program?
    - Trainees learning?
    - Trainers' conduct of session?
    - Provision of support materials?
    - Program management team?
    - Venue and accommodation?
    - Readiness of implement Grade 10 science curriculum?

In order to ascertain the effectiveness of the training program, the participants were asked to accomplish the End of the Program Assessment. Responses of the 34 participants randomly selected from different school districts in the Division of Iloilo City Schools were generated for data analysis. Table 4 shows the descriptive statistics for the Capacity Building Program evaluation.

Table 4: Mean and Standard Deviations to Evaluate the Effectiveness of the Capacity Building Program Implementation

Capacity Building Program Components	N	Mean	SD	Description
A. Program planning, management and preparation	34	3.598	0.463	very effective
B. Attainment of objectives	34	3.637	0.452	very effective
C. Delivery of the content program	34	3.618	0.381	very effective
D. Trainees learning	34	3.588	0.427	very effective
E. Trainers' conduct of session	34	3.600	0.429	very effective
F. Provision of support materials	34	3.745	0.403	very effective
G. Program management team	34	3.598	0.484	very effective

Table 4: Contd.,				
H. Venue and accommodation	34	2.594	0.600	very effective
I. Readiness of implement grade 10 science curriculum	34	3.524	0.438	very effective
Overall	34	3.474	0.340	very effective

Note: *1.00-1.59 (Not Effective) 1.60-2.19 (Fairly Effective) 2.20-2.79 (Moderately Effective) 2.80-3.39 (Effective), 3.40-4.00 (Very Effective)*

The implementation of the Capacity Building Program for Grade 10 Science Teachers was generally perceived to be "*Very Effective*" as reflected by the participants' rating (M = 3.474, SD = 0.340). All of the program components were rated very effective except for the venue and accommodation which was rated "*Fairly Effective*" only (M = 2.594, SD = 0.600).

The other eight components which were all rated "Very Effective" include the following, namely: Program Planning, Management and Preparation (M = 3.598, SD = 0.463), Attainment of Objectives (M = 3.637, SD = 0.452) Delivery of the Content Program (M = 3.618, SD = 0.381), Trainees Learning (M = 3.588, SD = 0.427) Trainers' Conduct of Session (M = 3.600, SD = 0.429), Provision of Support Materials (M = 3.745, SD = 0.403) Program Management Team (M = 3.598, SD = 0.484), Readiness of Implement Grade 10 Science Curriculum (M = 3.524, SD = 0.438). As reflected in the data, the small values of the standard deviations ranging from 0.340 to 0.600 indicated the similarity and the closeness of responses of the participants to the different items in the End of the Program Assessment.

On the other hand among the components of the End of the Program Assessment, Provision of Support Materials obtained the highest rating (M = 3.745, SD = 0.403) which was considered as very effective by the participants. This was closely followed by Attainment of Objectives (M = 3.637, SD = 0.452) and Delivery of the Content Program (M = 3.618, SD = 0.381). These results imply that the management team of the K to 12 training program were very efficient and likewise effective in securing the support materials needed for the effective delivery of the program contents that led to the successful attainment of program objectives.

CONCLUSIONS AND RECOMMENDATIONS

The Capacity Building Program made a remarkable improvement on the teacher-participants classroom performance and that the teacher-training program had significant impact on process, growth of teachers, their roles and responsibilities under the K to 12 Enhanced Basic Education Curriculum. It may be concluded from the perspective of the participants that the Capacity Building Program contributed positively to the different aspects of their personal growth in their performance and responsibilities as well as their realization on the importance of K to 12 enrichment activities that helped them become effective implementers of the new science curriculum. Likewise, the school heads were unanimous in their observation as to the positive change in the overall performance of science teachers in their respective schools. The Science Teaching Efficacy Belief of the teachers who participated in the Capacity Building Program had improved. The participants increased their confidence in their ability to perform a certain task, particularly teaching science domains effectively. The science content knowledge and pedagogical competencies of the teacher-participants were enhanced after the Capacity Building Program. Thus, an increase in their content knowledge and pedagogical skills would boost the teachers-participants' confidence in teaching science under the K to 12 program. Teacher-participants' classroom performance had been consistently rated to a high extent. Finally, it can be concluded that the results of the implementation of the Capacity Building Program for Grade 10 Science Teachers was generally considered very effective.

The training program had served its intended purpose and it was successful as measured by its effects on the participants.

The Capacity Building Program should be sustained as a professional development for K to 12 teachers. The Department of Education should offer a periodic conduct of the Capacity Building Program to constantly enhance and upgrade the science teachers' content knowledge and pedagogical competencies under the K to 12 program. Authentic assessment should also be given emphasis, clarity and more time in the training for the teachers to imbibe the real essence of assessment of learning outcomes. Continue and enhance the use of the training design for Capacity Building Program providing more flexibility to suit the competency needs of the participants and goals and objectives of the program. Explore other models of science inquiry-based teaching and learning as the delivery modes of the Capacity Building Program. Explore other facets of participants' satisfaction on the conduct of the session and how the trainers facilitated the Capacity Building Program. The Training and Development Divisions of the Department of Education (DepED) regional offices should include in their mandate the monitoring of the implementation of the Capacity Building Program. Periodic reports of the monitoring activities should be submitted to the DepED national office as it may serve as a reference on how the training program can be improved. The same monitoring report may also be considered as the basis for the revision of the learners' manual. It is likewise encouraged to investigate further whether the Science Teaching Efficacy Belief of the teacher-participants of the Capacity Building Program have positive implications on students' learning.

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